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Certified by



Jon W Dudas

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PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(b)(2).

Docket #: 50500-161P

Type a plus sign (+) inside this box→

+

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19249 U.S. PTO
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100803

TITLE OF THE INVENTION (280 characters max)

Foldable Modular Light Array

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification Number of Pages [8]
☒ Drawing(s) Number of Sheets [9]

☐ Other (specify):

METHOD OF PAYMENT (check one)

☒ A check is enclosed to cover the Provisional filing fees
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PROVISIONAL FILING FEE
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The invention was made by an agency of the United States Government or under a contract with an agency of the
 United States Government

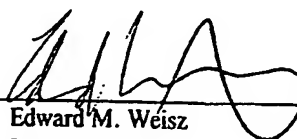
☒ No☐ Yes, the name of the U.S. Government agency and the Government contract number are: _☒ Small Entity Status is claimed

Respectfully submitted,

Dated: October 8, 2003

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UNITED STATES

PROVISIONAL PATENT APPLICATION

Foldable Modular Light Array

Inventor:

Marc H. SEGAN

BACKGROUND OF THE INVENTION

This invention relates to light emitting diode (LED) display panels composed of a plurality of light emitting diode elements. This invention is a decorative lighting device, for home use by consumers, to display messages (text) and graphics (pictures) by selectively illuminating lights (LEDs) in a rectangular array. A micro-controller stores images and feeds them in sequence, to the array of lights.

LED based display signs are available in all sizes for commercial purposes. The cost can be relatively high, as these are typically intended for permanent installation.

Small LED based display signs are available for consumer uses. Typically, these units rely on an array of LEDs mounted in one or several PC Boards. The overall size is limited, because the PC Boards are fragile if made too large. Also, PC Boards in large sizes are expensive for consumer applications.

SUMMARY OF THE INVENTION

The invention allows a larger LED based display sign for consumer use. Construction principles allow this unit to be much larger than existing consumer displays, while avoiding the high cost of more permanent commercial units.

One major purpose of the invention is for consumer use in decorating the home for holidays such as Christmas, when lights are commonly hung on the exterior of homes. Use of the invention will allow graphic images and messages to appear and to move as part of the decoration of a home, which otherwise would be decorated in mostly non-figurative and non-object oriented general color-based effects.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Drawing 1: Five sub-panels hinged together, showing the folded and unfolded views in perspective.

5 Drawing 2: Five sub-panels hinged together, showing the folded and the unfolded views in side and front views.

(1) Five sub-panels folded for storage.

(2) Five sub-panels unfolded for display.

(3) Five sub-panels unfolded – front view.

10 Drawing 3

(4) Box to hold PCBoards – two parts – top housing and bottom housing.

Drawing 4 Blank

Drawing 5 Wiring diagram showing Column Drivers and Row Drivers

Drawing 6 Exploded view drawing showing Support Base, soldering to LEDs,
15 translucent cover, and back cover.

Drawing 7 LED mounting – front and side views.

Drawing 8 Hinge between sub-panels – front and side views.

Drawing 9 Hinge between panels – exploded view.

Drawing 10 LED mounting

20 Drawing 11 Blank

Drawing 12 Blank

Drawing 13 Blank

Drawing 14 Lit-up panel showing the word "CHRISTMAS".

Drawing 15 Electronic prototype model.

Drawing 16 Model of 4 LED section of panel.

Drawing 17 Schematic 1 of 3

5 Drawing 18 Schematic 2 of 3

Drawing 19 Schematic 3 of 3

Drawing 20 Blank

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

10 The invention allows a larger LED based display sign for consumer use. Construction principles allow this unit to be much larger than existing consumer displays, while avoiding the high cost of more permanent commercial units.

 One major purpose of the invention is for consumer use in decorating the home for holidays such as Christmas, when lights are commonly hung on the exterior of
15 homes. Use of the invention will allow graphic images and messages to appear and to move as part of the decoration of a home, which otherwise would be decorated in mostly non-figurative and non-object oriented general color-based effects.

 The preferred embodiment of the inventive display is 20" x 62". At this large size, and particularly for outdoor use, one major concern is to make a design
20 pervious, e.g., with lots of through-holes in the panel, so that wind can pass through and not adversely affect the position of the display. Otherwise, the display may cause damage to the home or to bystanders.

Folding

Unlike other large rigid message display signs, this product is made in several (5) smaller panels, with hinges between the panel, such that the several panels
5 can be folded up against each other. There are several advantages to this design:

a) Ease of handling in the retail environment. Stores can more easily fit a 15" x 21" x 8" box onto their shelves, than a 62" x 21" x 2" flat box. Retail customers, can more easily handle the smaller package, fitting it into shopping carts and automobiles.

10 b) Ease of handling during installation by the consumer: Installing Christmas lights often involves much climbing on ladders and roofs, in order to place lights in a high location for best visibility. This product's folding design allows it to be easily carried up a ladder without being cumbersome to handle. Once the customer is at the proper height, the
15 panels can be unfolded and installed to the house.

c) Ease of setting up the display. Because the individual display panels are hinged to each other and are capable of being folded against each other, the display can be set up by simply unfolding the panels and standing them horizontally along a common edge in a zig-zag pattern.

20 Holes through

Holiday lighting decorations are designed for temporary installation and use by retail customers -- not professional installers or riggers. A solid panel

of the size 62" x 21" would easily catch the wind during installation or use, putting huge stresses on the panel itself, on the mounting hardware, on the house where the mounting hardware is attached, and on the person carrying the panel during installation. This product avoids these problems by being constructed as a very open mesh, with large openings all over its surface so that the panels are pervious to the wind, thereby allowing the wind to simply pass through the panels.

Modularity

The individual panels are detachable from each other. This allows the invention to be expanded or contracted by connecting or detaching panels to the overall display. The wiring is such that the horizontal dimension of the array is readily expandable through the addition of panels.

Lightweight, flexible, portable

Large message display panels are typically designed for permanent installations. This product is lightweight, due to the removal of material achieved by making the holes through it as described above. All heavy components (such as the power supply / transformer are located OFF the panel, in a separate enclosure, to further reduce the weight of the panel. This allows the panel to be a minimal weight for its size, which allows easiest mounting, by the consumer, in a temporary manner. For example, the panel might be lashed to the house with string, instead of bolted in place like a rigid commercial display panel. Also, because of the hole-through design, there

are a great number of fastening regions for lashings, i.e. through any of the holes on the panels.

The removal of the transformer and power supply from the panel, such that there is only a low voltage wire connection between the two, allows the panel to receive only safe low voltage electricity, while the power supply handles the higher power (110v in USA) from the mains. This allows the construction of the panel to be more open and less enclosed than that which is required for a typical display panel running. This adds to the weight reduction possible in the panel.

Vertical or horizontal Orientation

This invention has a simple single switch which the consumer can set to tell the panel if it is mounted in the vertical or the horizontal direction. Different "shows" (the program of lights that are illuminated) are played according to the orientation of the panel. Therefore, this product can be displayed either horizontally or vertically. The advantage of this for the consumer is that in the vertical mode, the typical 5 foot long display (comprised of five separate one-foot panels hingedly connected o each other will easily mount on a typical door (height 6' 8"), or on a chimney. This vertical display orientation may be preferred for those installations where there is no convenient location for horizontal display on the house itself or on the surrounding property.

LEDs without PC Boards

To allow this product to be large, with spacing between the LEDs and an open framework design with holes, PCBoards that are typically used to mount LEDs have been eliminated. Instead, the LEDs on each panel are wired in an 8x12 array,

with each LED connected to two wires, that run in the framework of the panel. These wires form a matrix that is connected to small PCBoards in several boxes (6) located around the sub-panels that make up the whole display panel. The wiring is such that the array is divided into two horizontal regions; a top region containing rows A-F, and a bottom region containing rows A'-F'. A continuous wiring circuit is formed through each row pair (A - A') such that a high current condition (e.g. a data signal is applied to address some or all of the lights in the row pair. Shift registers are used to address the negative terminals in the columns to thereby activate selected lights in the array. The arrangement of the LEDs in this manner effectively produces two 6x16 arrays.

Each LED is also covered by a translucent cover to simulate a larger bulb appearance which improves the aesthetics of the device from a distance when the device is active.

The advantages of the elimination of PCBoards include:

a) Cost reduction , as large PCBoards can be expensive.

b) Durability: Large PCBoards are not flexible, and can crack if flexed.

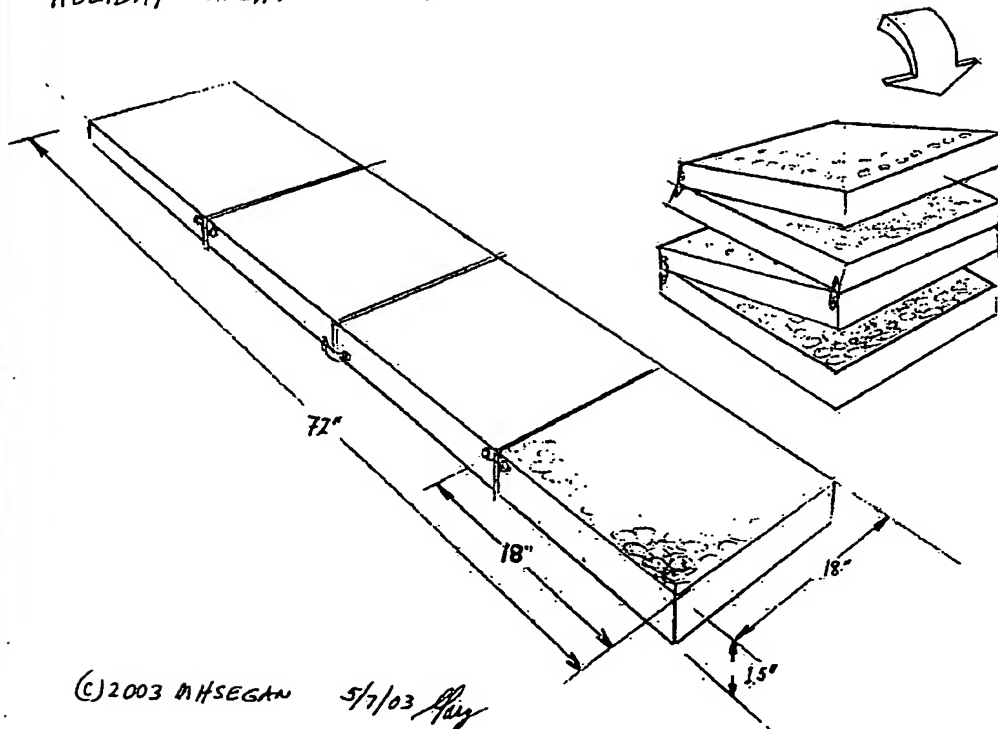
Inclusion of large PCBoards in a display panel require a rigid structure.

Eliminating them allows us to design a flexible structure.

The wiring of the individual LEDs of each panel is shown in the figures.

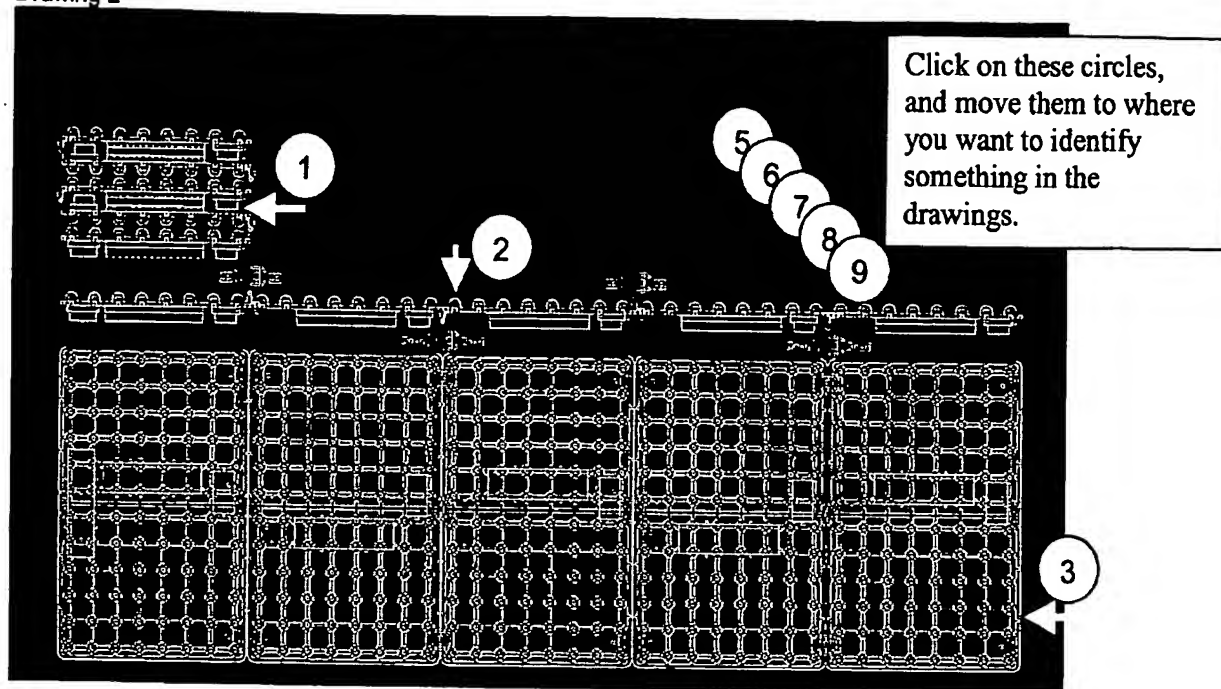
Drawing1

TIME SQUARE
HOLIDAY LIGHT DISPLAY

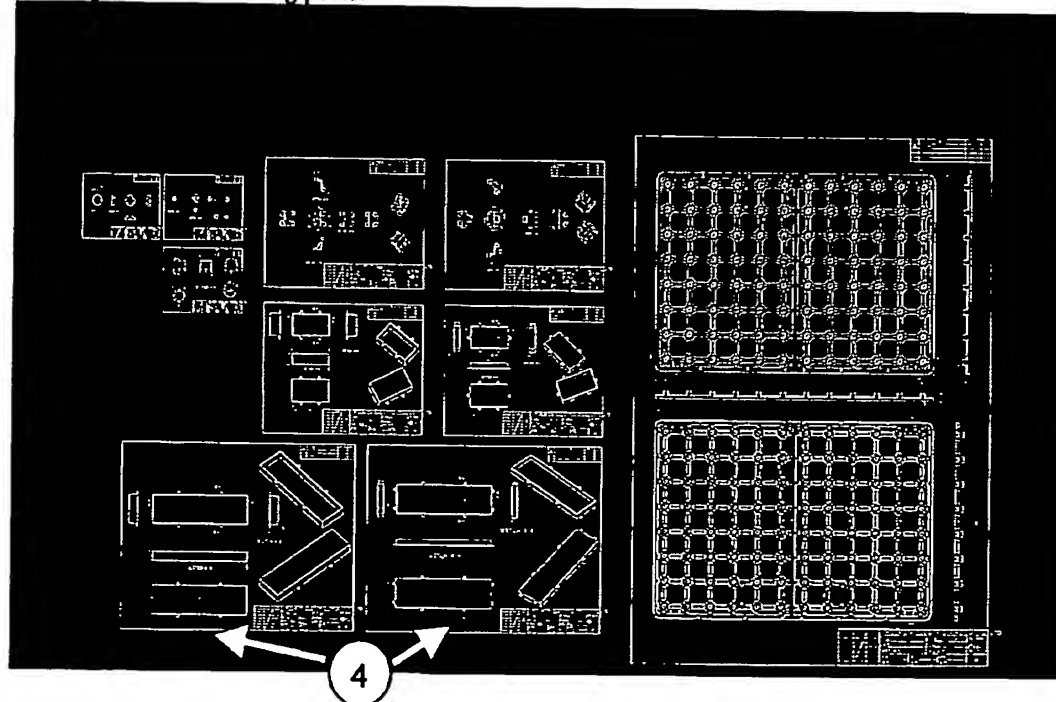


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Drawing 2

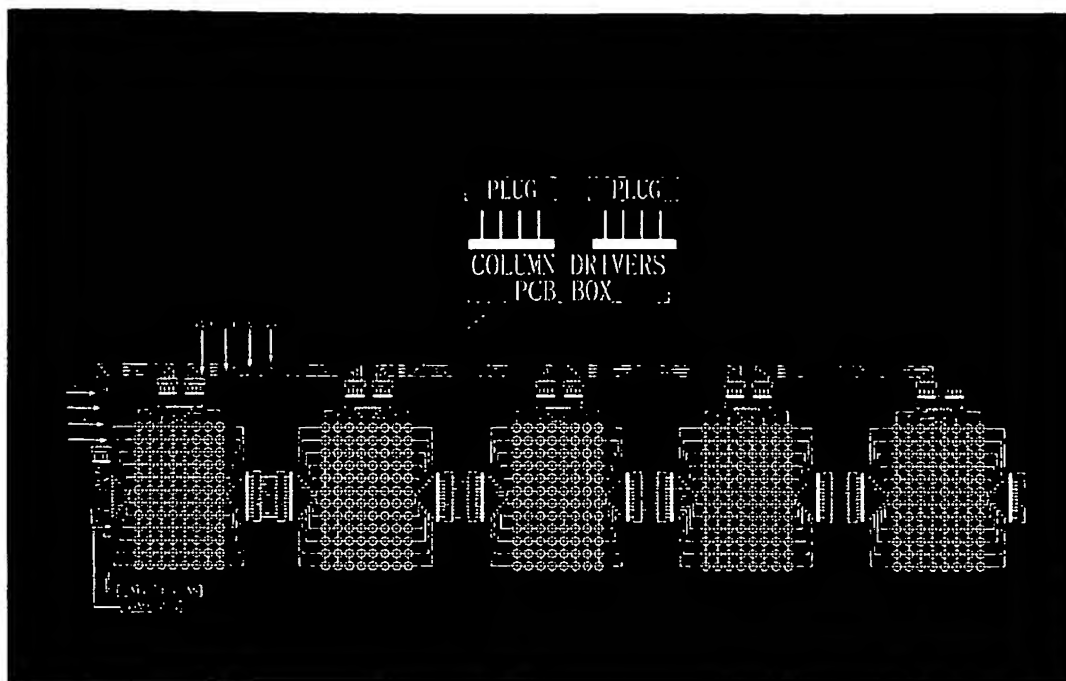


Drawing 3: Plastic housing parts.

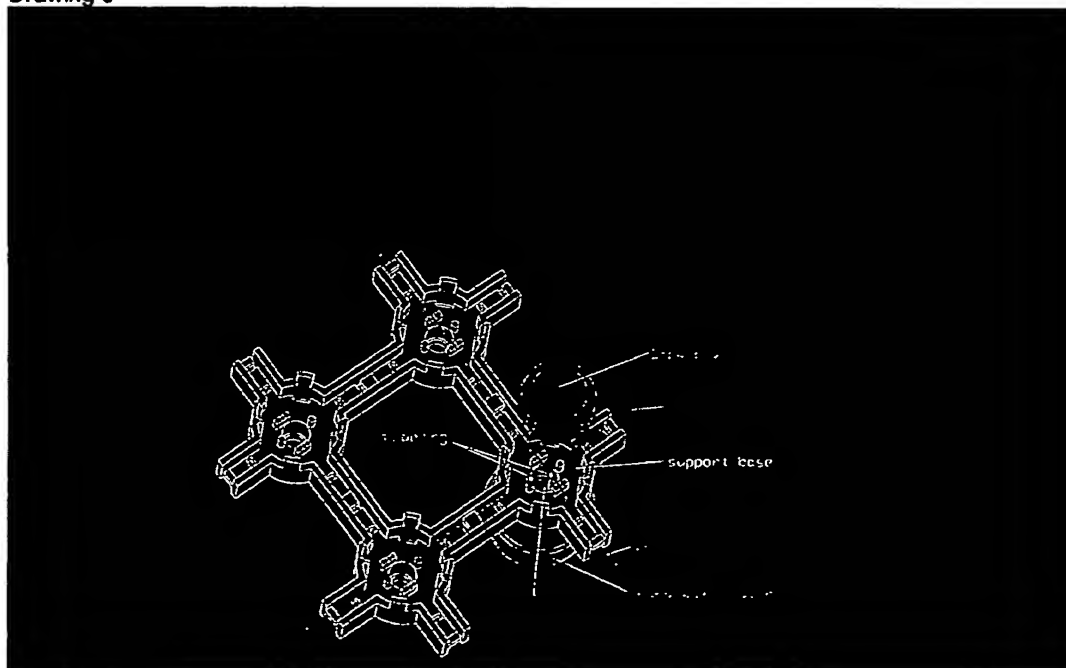


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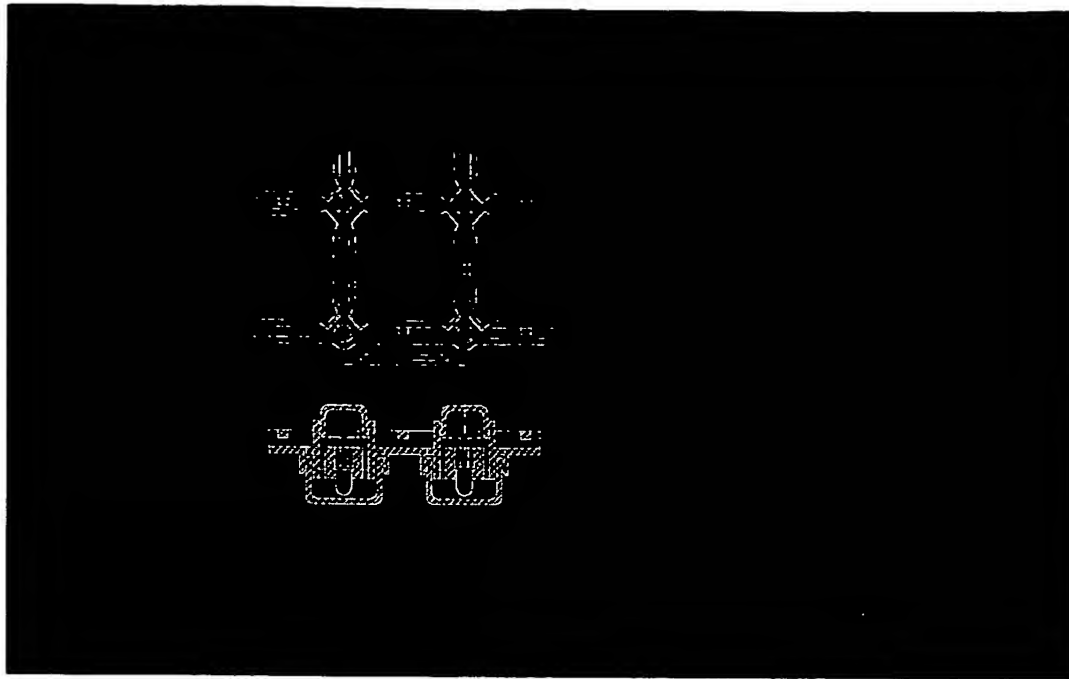
Drawing 5



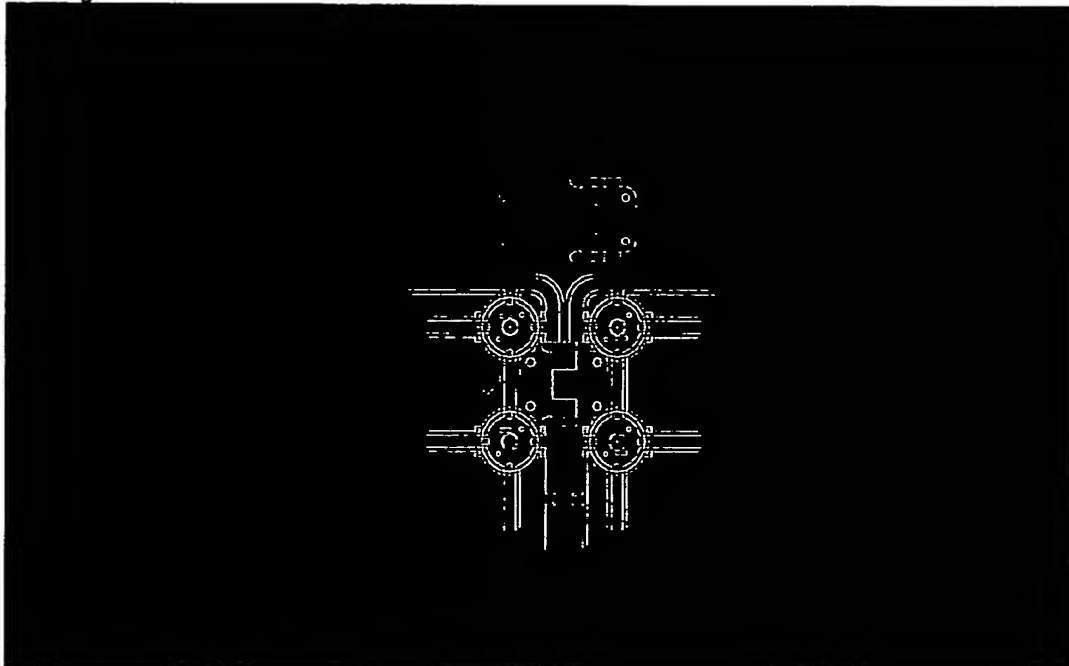
Drawing 6



Drawing 7

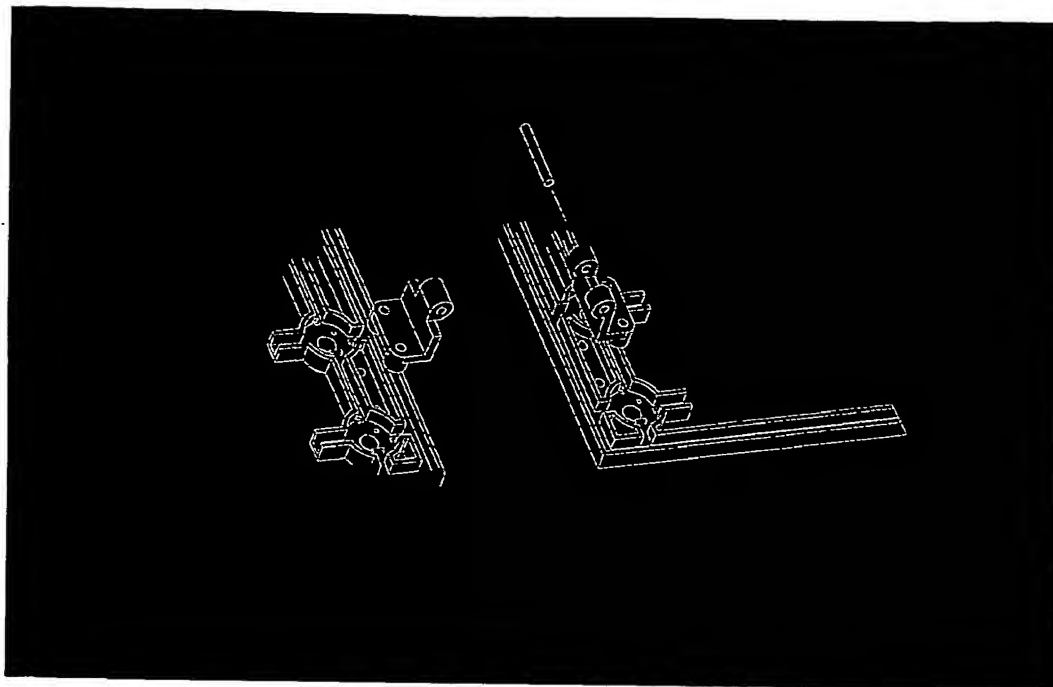


Drawing 8



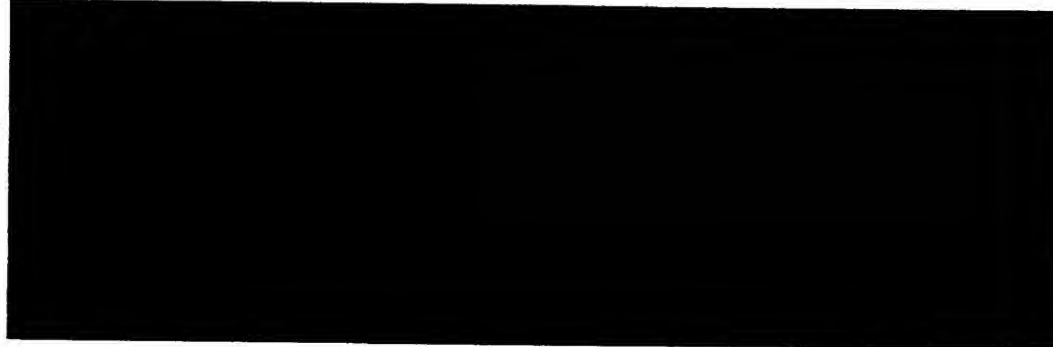
Drawing 9

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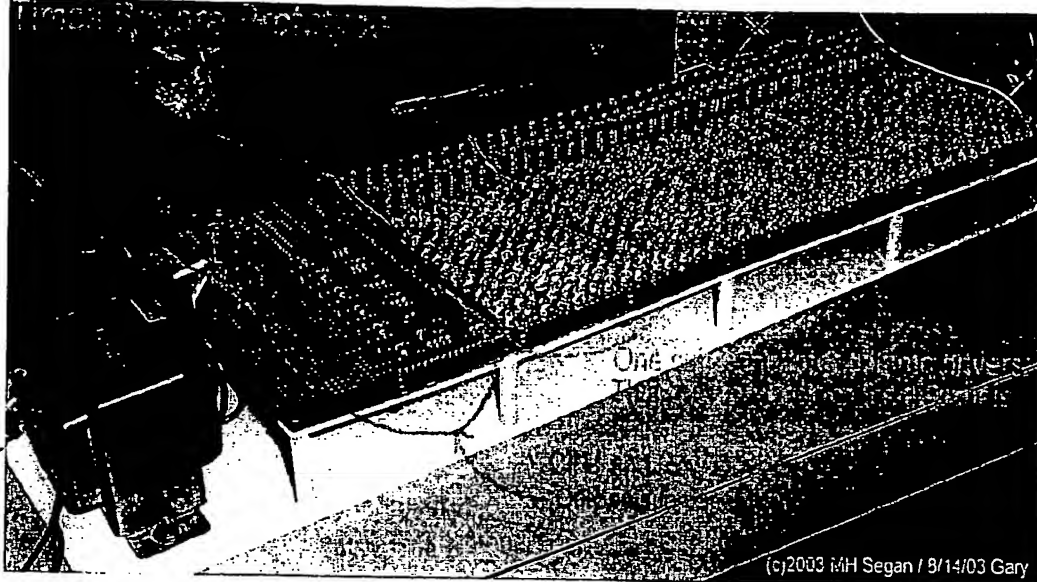
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Drawing 14

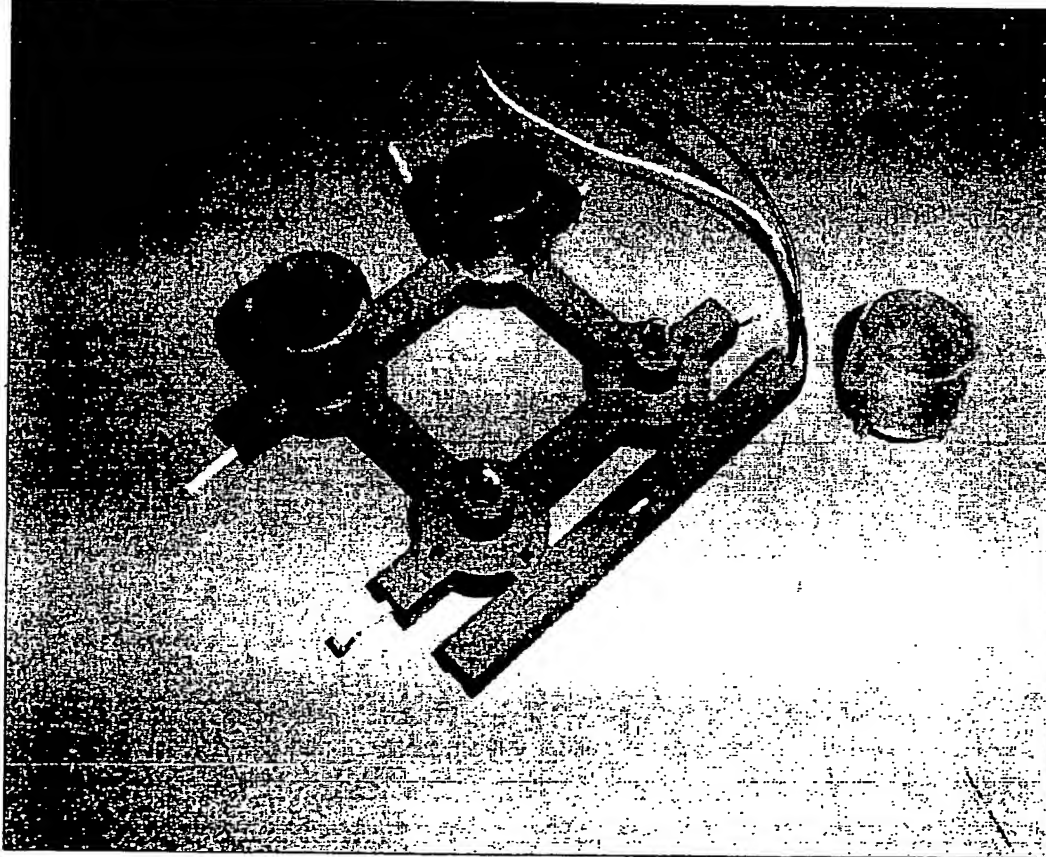


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Drawing 15

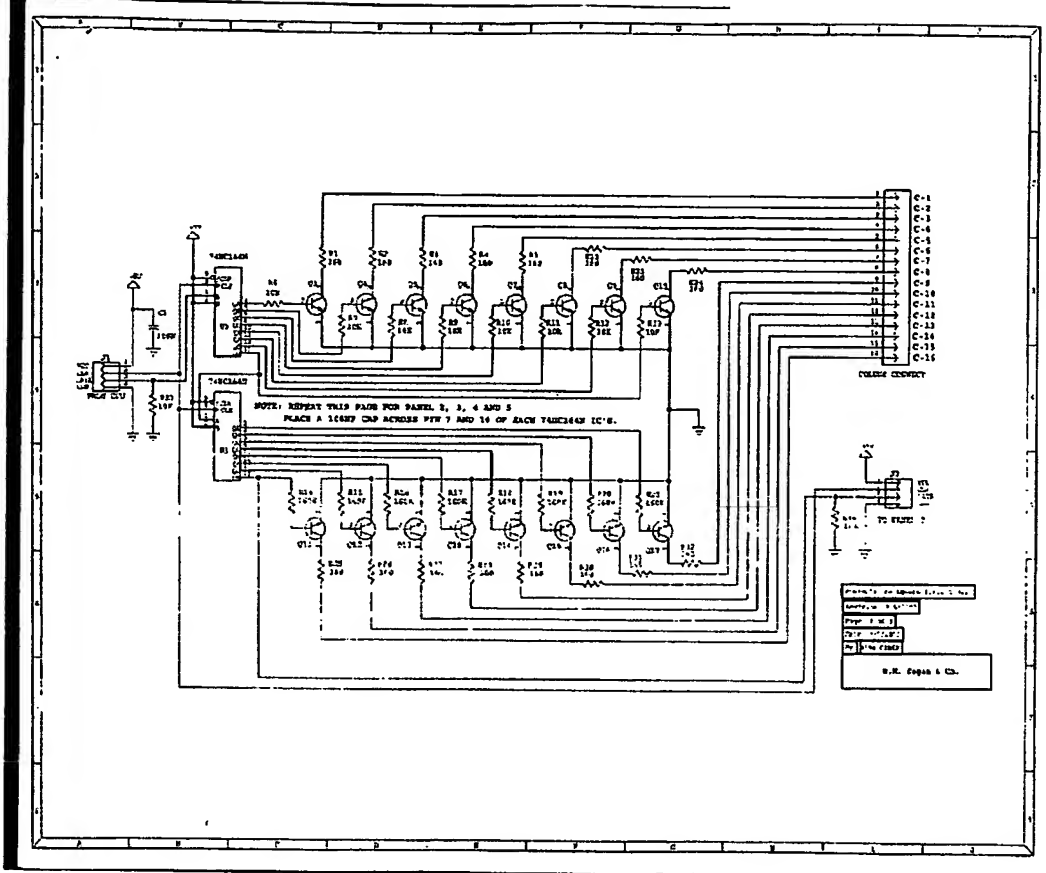


Drawing 16

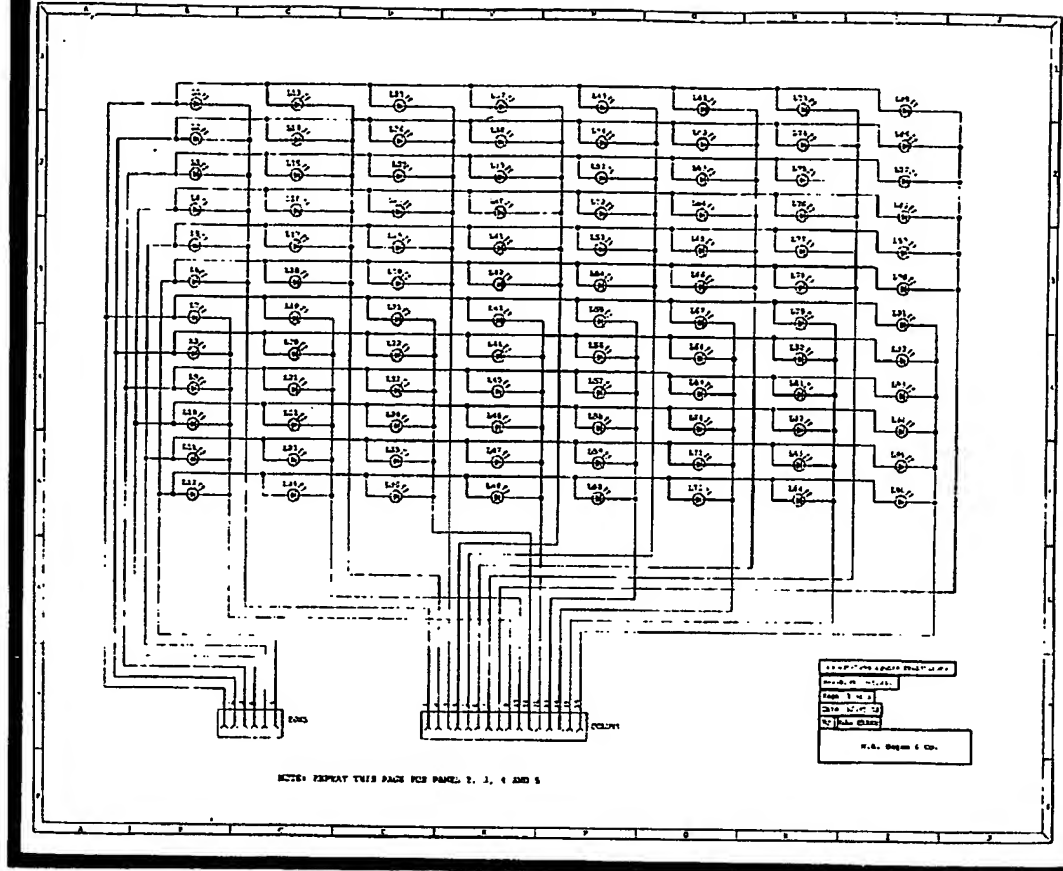


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Drawing 18



Drawing 19



Drawing 20 Blank

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